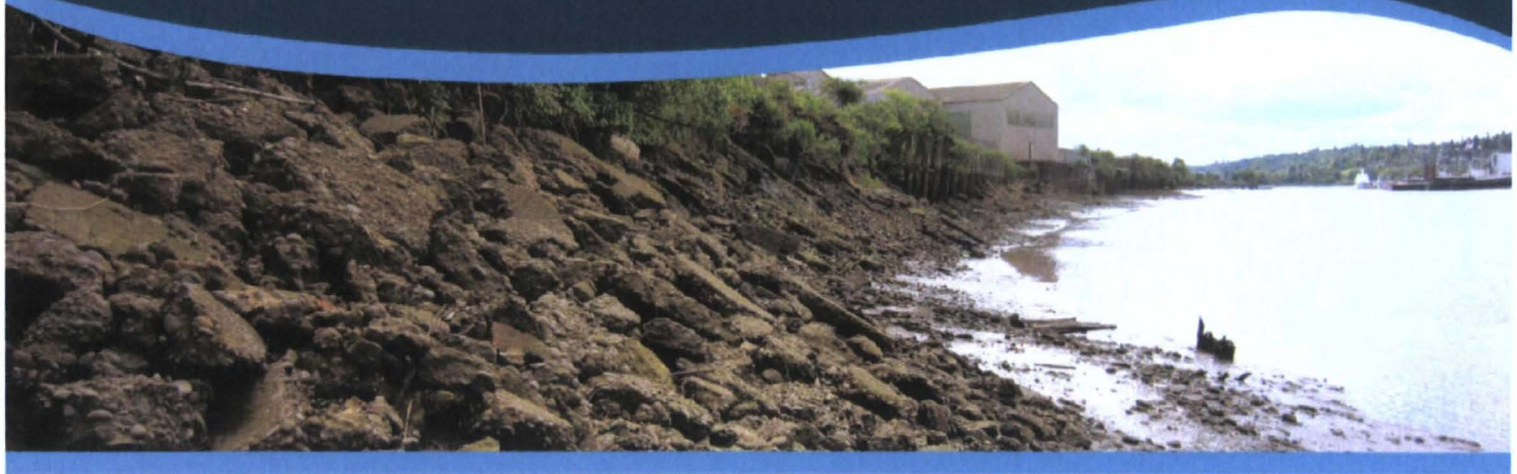


LDW SF 4.85
8-8-12

REPORT



PHASE 2 GEOPROBE INVESTIGATION SUMMARY REPORT JORGENSEN FORGE OUTFALL SITE

Prepared for

Jorgensen Forge Corporation
and
The Boeing Company

Prepared by

Anchor QEA, LLC
720 Olive Way
Suite 1900
Seattle, Washington 98101

And

Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

August 8, 2012

USEPA SF



1475196

PHASE 2 GEOPROBE INVESTIGATION SUMMARY REPORT JORGENSEN FORGE OUTFALL SITE

Prepared for

Jorgensen Forge Corporation

and

The Boeing Company

Prepared by

Anchor QEA, LLC

720 Olive Way

Suite 1900

Seattle, Washington 98101

And

Farallon Consulting, L.L.C.

975 5th Avenue Northwest

Issaquah, Washington 98027

August 8, 2012

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Background.....	1
1.2	Phase 2 Work Plan Objectives and Analytical Screening Levels.....	2
1.3	Report Organization.....	2
2	SUMMARY OF WORK PERFORMED	4
2.1	Phase 2 Work Plan Scope of Work.....	4
2.2	Field Activities.....	4
2.3	Phase 2 Work Plan Modifications.....	7
2.3.1	Elimination of Boring B-DGS2	7
2.3.2	Relocation of Boring B-DGP1.....	8
2.3.3	Addition of Boring JF-DGP6.....	8
2.4	Observed Geological Conditions.....	8
3	SUMMARY OF ANALYTICAL RESULTS.....	11
3.1	Phase 2 Investigation Screening Levels	11
3.2	Phase 2 Investigation Soil Analytical Results.....	11
3.2.1	PCBs	11
3.2.2	VOCs	12
3.2.3	SVOCs	12
3.2.4	Metals	12
3.3	Phase 2 Investigation Quality Assurance Samples	13
3.4	2-66 Sheetpile Investigation Soil Analytical Results.....	13
3.4.1	PCBs	13
3.4.2	VOCs	14
3.4.3	Metals	14
4	DATA QUALITY REVIEW	15
4.1	Field Quality Control Sample Collection.....	15
4.2	Data Quality Review and Validation	15
5	COST SUMMARY.....	16
6	CONCLUSIONS	17
6.1	Objective 1: Lateral and Vertical Extents of PCBs Greater than 1 mg/kg	17

6.2	Objective 2: Additional Chemical Analyses to Support Removal Action Evaluations	17
6.3	Objective 3: Correlation of Debris Fill and Chemical Concentrations	18
7	REFERENCES	19

List of Tables

Table 1	Boring Location Coordinates (on DVD)
Table 2	Analytical Results (on DVD)

List of Figures

Figure 1	Vicinity Map
Figure 2	Total PCB Results Plan View
Figures 3a-b	Total PCB Concentration by Depth

List of Appendices

Appendix A	Photographs (on DVD)
Appendix B	Boring Logs
Appendix C	Analytical Reports (on DVD)
Appendix D	Data Validation Reports (on DVD)
Appendix E	Boeing Split Data Lab Reports (on DVD)
Appendix F	Select Tables from the Draft Final 2-66 Area Focused Soil and Groundwater Investigation Report (on DVD)

LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
2-66 Sheetpile Investigation	<i>Draft Final 2-66 Area Focused Soil and Groundwater Investigation Report</i>
AOC	Administrative Order on Consent
Anchor QEA	Anchor QEA, LLC
ARI	Analytical Resources, Inc.
bgs	below ground surface
Boeing	The Boeing Company
COC	chemical of concern
DVR	data validation report
EPA	U.S. Environmental Protection Agency
Farallon	Farallon Consulting, L.L.C.
FCR	Field Change Request
Jorgensen Forge	Jorgensen Forge Corporation
LDC	Laboratory Data Consultants
LDW	Lower Duwamish Waterway
mg/kg	milligrams per kilogram
Modified AOC	First Modification to the Administrative Order on Consent
MTCA	Model Toxics Control Act
NWTPH-Dx	Northwest total petroleum hydrocarbons – diesel range
Outfall Site	Property Line Outfall Site
PCB	polychlorinated biphenyl
PID	photoionization detector
Phase 1 Work Plan	<i>Source Control Action, 15-inch and 24-inch Pipes Cleanout Work Plan</i>
Phase 2 Investigation	Phase 2 Geoprobe Soil Investigation
Phase 2 Work Plan	<i>Phase 2 Geoprobe Soil Investigation Work Plan</i>
Pipes	24-inch and Boeing 12-inch property line storm pipes
ppm	parts per million
QA	Quality Assurance

QC	Quality Control
Summary Report	Phase 2 Geoprobe Soil Investigation Summary Report
SVOC	semivolatile organic compound
VOC	volatile organic compound

1 INTRODUCTION

This Phase 2 Geoprobe Soil Investigation (Phase 2 Investigation) Summary Report (Summary Report) has been prepared by Anchor QEA, LLC (Anchor QEA) and Farallon Consulting, L.L.C. (Farallon) on behalf of the Jorgensen Forge Corporation (Jorgensen Forge) and The Boeing Company (Boeing) pursuant to the First Modification to the Administrative Order on Consent (Modified AOC; CERCLA Docket No. 10-2011-0017) and in accordance with the *Phase 2 Geoprobe Soil Investigation Work Plan* (Phase 2 Work Plan; Farallon and Anchor QEA 2012). This Summary Report presents the results of the Phase 2 Investigation at the 24-inch and Boeing 12-inch property line storm pipes (herein referred to as the Pipes) at the Jorgensen Forge Outfall Site (Outfall Site) at 8531 East Marginal Way South in Seattle, Washington (Figure 1). The Outfall Site is located directly adjacent to the Lower Duwamish Waterway (LDW) Superfund Site.

1.1 Background

The U.S. Environmental Protection Agency (EPA)-approved Phase 1 Investigation was conducted by Boeing and Jorgensen Forge at the Outfall Site in February 2011 during cleanout and closure of the clay sections of the Pipes. The Phase 1 Investigation included advancing 12 direct-push borings to a depth of 15 to 25 feet below ground surface (bgs) along three transects perpendicular to the shoreline to evaluate whether a release of hazardous substances occurred to subsurface soil beneath the corrugated metal section of the Pipes (Figure 1). The Phase 1 Investigation was implemented in accordance with the *Source Control Action, 15-inch¹ and 24-inch Pipes Cleanout Work Plan* (Phase 1 Work Plan) dated November 23, 2010, which was prepared by Floyd|Snider (2010) as required by the EPA Administrative Order on Consent (AOC) entered into by Jorgensen Forge and Boeing in September 2011.

The Phase 1 Completion Report (Floyd|Snider 2011) contained the results of the borings and identified elevated polychlorinated biphenyl (PCB) concentrations in soil at depths from 8 to 25 feet bgs in the western portion of the Outfall Site (Floyd|Snider 2011). Based on the results of the Phase 1 Investigation, Boeing and Jorgensen Forge, together with EPA,

¹ The 15-inch pipe refers to its outer diameter; the inner diameter was determined to be 12 inches during the performance of the Phase 1 Work Plan.

amended the AOC to require further investigation to assess the nature and extent of the elevated PCB concentrations in the soil and the collection of sufficient data to define any potential future removal action at the Outfall Site. To address the data gaps identified during the Phase 1 Investigation, Jorgensen Forge and Boeing developed the Phase 2 Work Plan in accordance with the Modified AOC entered into by Jorgensen Forge and Boeing in September 2011. The Phase 2 Investigation was conducted in late March 2012 following EPA approval of the Phase 2 Work Plan on March 26, 2012.

1.2 Phase 2 Work Plan Objectives and Analytical Screening Levels

The objectives of the Phase 2 Work Plan included:

1. Determining the lateral and vertical extent of soil containing concentrations of PCBs above 1 milligram per kilogram (mg/kg) in the vicinity of Phase 1 Investigation borings T1B3 and T2B4.
2. If necessary, additional chemical analysis to evaluate the extent of any removal action with respect to waste management/disposal suitability, worker safety, and sediment protectiveness.
3. Evaluating the association between debris fill in the vicinity of the outfalls and possible PCB and other chemical occurrences, if analyzed as part of Objective 2.

To determine the lateral and vertical extent of PCBs in soil, the Phase 2 Investigation soil concentrations were preliminarily compared to the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A, Unrestricted Land Use cleanup levels for PCBs, as established in Section 720 of Chapter 173-340 of the Washington Administrative Code (WAC) 173-340-720. Metals soil concentrations were also compared to MTCA Method A cleanup levels as a preliminary screening level. Final cleanup levels will be determined as part of any potential future Outfall Site removal action, as appropriate.

1.3 Report Organization

The remainder of this report is organized into the following sections:

- **Section 2 – Summary of Work Performed:** Describes the approved Phase 2 Work Plan and Work Plan modifications, sample locations, and procedures

- **Section 3 – Summary of Analytical Results:** Summarizes the Phase 2 Investigation soil analytical results
- **Section 4 – Data Quality Review:** Summarizes the Phase 2 Investigation data quality review
- **Section 5 – Cost Summary:** Summarizes the costs to perform the Phase 2 Investigation
- **Section 6 – Conclusions:** States the Phase 2 Investigation conclusions
- **Section 7 – References:** Provides references identified in the Summary Report

UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

- Sender: Please print your name, address, and ZIP+4 in this box •

Michael Sibley II
U.S. Environmental Protection Agency
ECL-116, Suite 900
1200 Sixth Avenue
Seattle, Washington 98101

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

ok Garson
oeing Company
ox 3707

Washington 98124-2207

2. Article Number
(Transfer from service label)

7010 1060 0002 0288 3659

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

Mike Myers

☐ Agent☐ Addressee

B. Received by (Printed Name)

Mike Myers

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes

If YES, enter delivery address below:

☐ No

SEP 14 2012

3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☒ Return Receipt for Merchandise☐ Insured Mail☒ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

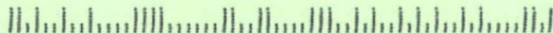
UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

- Sender: Please print your name, address, and ZIP+4 in this box •

Michael Sibley II
U.S. Environmental Protection Agency
ECL-116, Suite 900
1200 Sixth Avenue
Seattle, Washington 98101



SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

n Gross
sen-Forge Corporation
East Marginal Way South
e, Washington 98108-4018

2. Article Number

(Transfer from service label)

COMPLETE THIS SECTION ON DELIVERY

A. Signature

☒ *Thyllis Brown*☐ Agent☒ Addressee

B. Received by (Printed Name)

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes

If YES, enter delivery address below:

☐ No

3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☒ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

7010 1060 0002 0288 3628

2 SUMMARY OF WORK PERFORMED

The Phase 2 Investigation field sampling was conducted from March 27 to 30, 2012, and included advancing 12 direct-push borings to a maximum depth of 38.8 feet bgs. Soil and quality assurance (QA) samples were collected and submitted for laboratory analysis per the Phase 2 Work Plan. The boring locations were selected based on the results of the Phase 1 Investigation, as detailed in the Phase 2 Work Plan, with the primary objective to determine the lateral and vertical extent of PCBs in soil greater than 1 mg/kg. A summary of the work performed is summarized in the following subsections.

2.1 Phase 2 Work Plan Scope of Work

The Phase 2 Investigation was conducted in accordance with the EPA-approved Phase 2 Work Plan developed to meet the requirements of the Modified AOC. The field program outlined in the Phase 2 Work Plan included the following:

- Preparing a Health and Safety Plan in accordance with Part 1910.120 of Title 29 of the Code of Federal Regulations prior to conducting field activities;
- Performing a utility locate at the proposed boring locations using the one-call Utility Notification Center to mark underground utility lines in easements and rights-of-way, and Applied Professional Services Inc. of North Bend, Washington, for the private utility location service;
- Advancing 12 direct-push borings to a maximum depth of 38.8 feet bgs; and
- Collecting soil and QA samples for logging and chemical analysis.

A description of the Phase 2 Investigation field activities is provided in the following subsections.

2.2 Field Activities

The borings were completed using a track-mounted Geoprobe drill rig operated by Cascade Drilling, L.P. of Woodinville, Washington. The 12 boring locations (JF-DGP1 through JF-DGP6, JF-DGS1 through JF-DGS3, JF-DGT1, B-DGS1, and B-DGP1) are depicted on Figure 2. Coordinates of the boring locations are provided in Table 1.

In accordance with the Phase 2 Work Plan, soil samples from the borings were generally collected continuously in 2-foot intervals, beginning at the ground surface and extending to a minimum depth of 5 feet into the native soil layer. Total boring depths ranged from 25 to 40 feet bgs. Soil samples were collected using a 3-inch-diameter, 5-foot-long macrocore sampler lined with an acetate sleeve. The acetate sleeve was removed from the stainless steel sampler and opened to reveal each sample interval. Soil cores were digitally photographed prior to sample collection with their boring identification and sample depths. Photographs are provided in Appendix A.

Soil samples were described in accordance with the Unified Soil Classification System and were screened in the field for potential evidence of contamination using visual observations and notations of odor and sheen, and by conducting headspace analysis using a photoionization detector (PID) to detect the presence of volatile organic vapors. Headspace analysis was conducted by placing soil from each sample interval into a resealable plastic bag and allowing the sample to equilibrate for several minutes. The probe of the PID was then inserted into the bag and the highest reading obtained over an approximately 30-second interval was recorded. Levels of volatile organic vapors measured in soil ranged from 0.3 to 34.1 parts per million (ppm). A faint odor and slightly elevated PID readings were observed in borings JF-DGP3, JF-DGP4, and JF-DGP6. Some slightly elevated PID readings were not coincident with observations of odor. Nine volatile organic compound (VOC) analyses were performed on samples with PID readings greater than 10 ppm. The Unified Soil Classification System along with any visual and/or olfactory notations of interest and PID reading results were recorded on boring log forms, which are provided in Appendix B.

Following retrieval, the acetate sleeves were placed on disposable plastic sheeting within the sample processing location and opened with a knife. Discrete samples for VOC analysis were collected directly from the acetate sleeves using EPA Method 5035 protocols. Composite samples were collected by removing soil in the specified sample interval from the acetate sleeves using disposable trowels and mixing the soil in a decontaminated stainless steel bowl. Both composite and discrete soil samples were placed into appropriate laboratory-prepared sample containers, labeled, and placed on ice in a cooler. Samples were transported under standard chain-of-custody protocols to Analytical Resources, Inc. (ARI) of Tukwila, Washington, for archival and/or laboratory analysis. Upon completion, each boring was

abandoned by backfilling with hydrated bentonite and sealed with concrete at the ground surface.

Reusable field sampling equipment was decontaminated before sampling activities were initiated, between sampling locations, and after sampling activities were completed. Reusable field sampling equipment was decontaminated by wiping down with paper towels, rinsing the sampling surfaces with methanol, and rinsing again with deionized water. Drilling equipment in direct contact with soil samples (e.g., drilling rods) was decontaminated by steam cleaning prior to the start of drilling and following completion of each boring. As much as possible, borings were drilled in the anticipated order of highest to lowest concentrations to minimize the likelihood of cross-contamination between boring locations.

Samples from all the borings were submitted to the laboratory; however, analyses were performed in a phased manner. According to the plan only samples from the seven primary boring locations underwent PCB analysis (B-DGP1, JF-DGP1 through JF-DGP5, and JF-DGP6). Additionally, three sample intervals from locations B-DGP1 (0 to 2 feet bgs), JF-DGP2 (10 to 11.8 feet bgs), and JF-DGP4 (20 to 22 feet bgs) were submitted for metals analysis based on visual soil observations, including presence of blue crystallization (B-DGP1) and anthropogenic debris including glass fragments; JF-DGP2 and JF-DGP4). Nine samples were also submitted for VOC analysis based primarily on samples with PID readings for greater than 10 ppm from locations JF-DGP3, JF-DGP4, and JF-DGP6. Following a review of the results of the PCB results from the primary borings, select sample intervals from all four secondary boring locations (B-DGS1 and JF-DGS1 through JF-DGS3) were submitted for PCB analysis in order to achieve the work plan objectives.

Also, in accordance with the Phase 2 Work Plan, samples from JF-DGP2 and JF-DGP5 were pre-selected for metal, VOC, and semivolatile organic compound (SVOC) analysis based on proximity to T2B4 (i.e., this location had highest observed total PCB concentrations identified during Phase 1 Investigation). JF-DGP2 and JF-DGP5 were each divided into three 10-foot composites (i.e., 0 to 10 feet bgs, 10 to 20 feet bgs and 20 to 30 feet bgs) for analysis. In addition to the six composite samples, three discrete depth intervals (i.e., B-

DGP-1, JF-DGS2, and JF-DGS4) were submitted for metals analysis based on visual field observations as described in the previous paragraph.

QA homogenization duplicates, rinse blank, and field blank samples were collected at the frequency prescribed in the Phase 2 Work Plan as discussed further in Section 4.

During the field event, Floyd|Snider, on behalf of Boeing, collected select sample intervals from borings B-DGS1 and B-DGP1 advanced on the Boeing property (Figure 2). The samples were collected and analyzed by Boeing at Eurofins Lancaster Laboratory of Lancaster, Pennsylvania for waste characterization and laboratory comparison purposes waste.

The laboratory analytical results for all soil samples collected, including those collected by Boeing, are summarized in Section 3.

2.3 Phase 2 Work Plan Modifications

During the field activities, several modifications to the Phase 2 Work Plan scope of work were proposed to the EPA in FCRs and approved by the EPA during the implementation of the Phase 2 Work Plan. Modifications to the Phase 2 Work Plan were as follows:

- Elimination of boring B-DGS2;
- Relocation of boring B-DGP1; and
- Addition of boring JF-DGP6.

Each modification is discussed below.

2.3.1 Elimination of Boring B-DGS2

Boring B-DGS2, located on Boeing property, was eliminated due to a co-located boring 2-66-SP-05 advanced by Boeing in November 2011, as reported in the *Draft Final 2-66 Area Focused Soil and Groundwater Investigation Report* (2-66 Sheeppile Investigation; Floyd|Snider 2012). Boeing collected the soil samples from boring 2-66-SP-05 in general accordance with the Phase 2 Work Plan procedures and by doing so fulfilled the objectives of the proposed boring at location B-DGS2. EPA approved the use of the data obtained from boring 2-66-SP-05 on March 27, 2012, in lieu of advancing boring B-DGS2.

2.3.2 Relocation of Boring B-DGP1

Boring B-DGP1, located on Boeing property, was relocated approximately 5 feet west of its proposed location due to a co-located boring 2-66-SP-09 previously advanced by Boeing proximate to the target location (Floyd|Snider 2012). Boring 2-66-SP-09 was completed using slightly modified procedures than those described in the Phase 2 Work Plan, so boring B-DGP1 was offset from the original target location to provide additional spatial data resolution. Relocation of boring B-DGP1 southwest of boring 2-66-SP-09 was approved by EPA on March 27, 2012.

2.3.3 Addition of Boring JF-DGP6

Boring JF-DGP6 was advanced between borings T2B4 and JF-DGP5, due to refusal at location JF-DGP5 prior to achieving the target penetration depth of a minimum 5 feet into native layer as defined in the Phase 2 Work Plan. Boring JF-DGP6 was added to achieve the target penetration depth in this area. EPA approved the addition of boring JF-DGP6 on April 2, 2012.

2.4 Observed Geological Conditions

The Phase 2 Investigation borings included continuous soil sampling through both fill material and native soils. Soil conditions were generally consistent with previous investigations completed during the Phase 1 Investigation. The soil types observed included mixtures of sand, silt, and gravel. Soil saturation was generally encountered at depths ranging from 6 to 15 feet bgs. Boring logs are included in Appendix B.

Soil consistent with previously documented “fill materials” during the Phase 1 Investigation was encountered at each boring. As noted in the boring logs (Appendix B), a “fine substance” was observed in at least one soil interval in all borings except JF-DGS1 and JF-DGT1. The fine substance was not classifiable as to soil type or origin. The fill material consisted of soil types ranging from sandy silt to silty sand with varying amounts of gravel. Varying amounts of wood were observed in soil samples collected at the following borings:

- B-DGS1 from 24.8 to 19.8 feet bgs;
- JF-DGP1 from 10 to 12.5 feet bgs and 20 to 23.5 feet bgs;

- JF-DGP2 from 20 to 24.8 feet bgs and 26 to 27 feet bgs;
- JF-DGP3 from 25 to 29 feet bgs;
- JF-DGP4 from 11 to 17.8 feet bgs and 21.5 to 28 feet bgs;
- JF-DGP5 from 19 to 19.8;
- JF-DGP6 from 16.5 and 22 feet bgs;
- JF-DGS1 from 0.3 to 3.3 feet bgs and 6 to 7 feet bgs; and
- JF-DGS3 from 18.3 to 24 feet bgs.

Varying amounts of glass fragments were observed in soil samples collected at the following borings:

- JF-DGP2 from 10 to 11.8;
- JF-DGP3 from 20 to 21 feet bgs;
- JF-DGP4 from 20 to 21.5 feet bgs;
- JF-DGP5 from 19 to 19.8 and 25 to 27.5 feet bgs; and
- JF-DGP6 from 16.5 to 22 feet bgs.

A debris-rich fill layer (identified as “debris fill,” consistent with the Phase 2 Work Plan nomenclature) was field identified at boring JF-DGP2 from 10 to 11.8 feet bgs and boring JF-DGP4 from 20 to 22 feet bgs. Based on boring log observations, boring JF-DGP3 from 20 to 21 feet bgs and JF-DGP6 from 16.5 to 22 feet bgs may also be considered “debris fill.” Two soil intervals at boring JF-DGP5 contained glass fragments but were not considered “debris fill” due to the limited density of fragments.

Sheen was observed in several soil intervals below the first encountered water-bearing zone (i.e. saturated soil) at borings JF-DGP1, JF-DGP3, JF-DGP4, JF-DGP5, JF-DGP6, and JF-DGS3. The observed sheen depths ranged from 15 to 29 feet bgs.

Soil consistent with “native soil” identified during previous investigations was also encountered in all borings at depths ranging from 15 to 27.5 feet bgs. The soil encountered generally consisted of well-graded sand with silt. Natural wood fragments, clay, and/or clay clasts indicative of native deposits were identified in soil samples collected from borings B-DGS1, JF-DGP2, and JF-DGP6. The occurrence of wood fragments and clay in native soils is

consistent with previous investigation results. The observed depth to native soil generally increased from east to west, approaching the riverbank.

3 SUMMARY OF ANALYTICAL RESULTS

The following sections summarize the analytical results of the Phase 2 Investigation as presented in Table 2. Figure 2 depicts the Phase 2 Investigation boring locations, select locations from the Phase 1 Investigation, and the prior Boeing 2-66 Sheetpile Investigation boring locations. All samples collected as part of the Phase 2 Investigation were analyzed by ARI. As specified in the Phase 2 Work Plan, soils were analyzed for PCBs by EPA Method 8082, mercury by EPA Method 7471A, metals by EPA Method 6010B, VOCs by EPA Method 8260C (collected by EPA Method 5035), and SVOCs by EPA Method 8270D. A copy of the Phase 2 Investigation laboratory analytical reports for the soil samples is provided in Appendix C.

3.1 Phase 2 Investigation Screening Levels

As discussed in Section 1.2, the Phase 2 Investigation soil analytical results were compared to the MTCA Method A cleanup levels as a preliminary screening evaluation consistent with the Modified AOC. Cleanup levels will be determined as part of any potential future Outfall Site removal action, as appropriate.

3.2 Phase 2 Investigation Soil Analytical Results

A summary of the soil analytical results by chemical of concern (COC) is provided below.

3.2.1 PCBs

A total of 91 soil samples were analyzed for PCB Aroclors for the primary borings intervals and select secondary intervals. Concentrations of PCBs were detected in soil in all Phase 2 Investigation borings at various depths ranging from approximately 2 to 32 feet bgs (Figure 2). The detected concentrations of total PCB concentrations greater than 1 mg/kg in soil ranged from 1.08 to 359 mg/kg (Table 2).

Where primary boring depth intervals results were greater than 1 mg/kg total PCBs, the same depth interval from the peripheral secondary boring locations B-DGS1, JF-DGS1, JF-DGS2, and JF-DGS3 were submitted for laboratory analysis of PCBs to further assess the lateral and vertical extent of PCBs. Secondary boring locations B-DGS1 and JF-DGS1

contained at least one interval with a total PCB concentration greater than 1 mg/kg. Where secondary location total PCB results were greater than 1 mg/kg, adjacent Phase 1 Investigation and 2-66 Sheetpile Investigation data provided lateral bounding, as shown in Figure 2. The tertiary boring locations identified in the Phase 2 Work Plan did not require PCB analysis to bound the extent of PCB contamination greater than 1 mg/kg total PCBs.

The Phase 2 Investigation total PCB results are presented in Figure 2. Interpolated total PCB contours for successively deeper 2-foot vertical depth intervals are shown in Figures 3a and 3b. The total PCB contours were bounded (as shown by question marks) on the shoreline area to the west and to the north at the existing Boeing 2-66 sheetpile wall.

3.2.2 VOCs

A total of 15 soil samples were analyzed for VOCs. Concentrations of VOC parameters were detected in all Phase 2 Investigation borings at various depths, but the detected concentrations did not exceed the preliminary screening levels (Table 2).

3.2.3 SVOCs

A total of six composite soil samples (sampled across multiple depth intervals) were submitted for SVOC analysis. Concentrations of SVOC parameters were detected in all Phase 2 Investigation samples at various depths, but the detected concentrations did not exceed the preliminary screening levels (Table 2).

3.2.4 Metals

A total of nine soil samples (six composite samples across multiple depth intervals and three discrete depth interval samples) were submitted for metals analyses as part of the Phase 2 Investigation, and four samples were submitted by Boeing for purposes as noted in Section 2.2. Concentrations of metals were detected in all sample intervals analyzed. As shown in Table 2, a single interval from boring locations B-DGS1 (0 to 2 feet bgs), JF-DGP4 (20 to 24 feet bgs), and JF-DGP5 (0 to 10 feet bgs) exceeded the preliminary screening levels for cadmium and lead. A single interval from B-DGP1 (2 to 3 feet bgs; collected by Boeing) exceeded the preliminary screening level for cadmium. A single boring interval from

location JF-DGS2 (10 to 11.8 feet bgs) exceeded the preliminary screening level for arsenic. All other metals results were below the preliminary screening levels.

3.3 Phase 2 Investigation Quality Assurance Samples

The QA field homogenization duplicates were generally of similar magnitude and showed relatively low homogenization variability. PCBs were not detected above reporting limits in the field blank and rinsate blank QA samples indicating the decontamination procedures were successful. Further data quality assessment is presented in Section 4.

As discussed in Section 2.2, Boeing collected select sample intervals from the borings (i.e., B-DGS1 and B-DGP1) advanced on the Boeing property (Figure 2). The samples were collected and analyzed by Boeing at Eurofins Lancaster Laboratory in Lancaster, Pennsylvania. The PCBs and metals analytical results are summarized in Table 2, and the lab report presenting these sample results for PCBs, metals, Northwest total petroleum hydrocarbons – diesel range (NWTPH-Dx), and VOCs analyses are included in Appendix E. There were no detections of NWTPH-Dx or VOC parameters above the reporting limits.

3.4 2-66 Sheetpile Investigation Soil Analytical Results

The laboratory analytical data for two of the 2-66 Sheetpile Investigation borings advanced on Boeing property that bordered the Phase 2 Investigation borings (2-66-SP-05 and 2-66-SP-10) are included in Appendix F. A summary of the soil analytical results by COC for the borings (2-66-SP-05 and 2-66-SP-10) that were used to support completion of the Phase 2 Investigation objectives is provided in Section 3.4.1 below. No data quality issues were noted in the 2-66 Sheetpile Investigation Report (Floyd|Snider 2012), so these data are considered useable for the Phase 2 Investigation objectives.

3.4.1 PCBs

Boeing submitted a total of ten samples for PCB aroclor analyses from two borings as described above. Concentrations of PCBs were detected in soil at various depths ranging from 0 to 15 feet bgs. There were no detected concentrations of total PCBs greater than 1 mg/kg in soil in boring 2-66-SP-05 and a detection of 9.1 mg/kg at boring 2-66-SP-10 from 0 to 5 feet bgs (Figure 2).

3.4.2 VOCs

Boeing submitted a total of ten samples for VOCs analyses. Concentrations of VOC parameters were detected in all 2-66 Sheetpile Investigation samples at various depths, but the detected concentrations did not exceed the preliminary screening levels (Appendix F).

3.4.3 Metals

Boeing submitted a total of ten soil samples for metals analyses. Concentrations of metals were detected in all sample intervals analyzed. As shown in Appendix F, exceedances of the preliminary screening levels were identified boring location 2-66-SP-05 (4 to 6 feet bgs and 10 to 12 feet bgs) for cadmium and mercury, respectively. Exceedances of the preliminary screening levels at station 2-66-SP-10 from 0 to 5 feet bgs (i.e., cadmium, copper, lead, and zinc) and 5 to 10 feet bgs (i.e., arsenic, cadmium, cobalt, copper, iron, and nickel) depth intervals. All other metals results were below the preliminary screening levels.

4 DATA QUALITY REVIEW

Soil sampling and analysis was performed in accordance with the Phase 2 Work Plan, and conformed to EPA direction, approval, and guidance regarding sampling, QA/quality control (QC), data validation, and chain-of-custody procedures. The following subsections provide further detail on data quality.

4.1 Field Quality Control Sample Collection

Field QC samples were collected at the frequency required including one field blank, one rinsate blank, and five duplicate samples.

4.2 Data Quality Review and Validation

Laboratory data were generated by ARI, and validated by Laboratory Data Consultants (LDC), Inc. of Carlsbad, California, an independent data validation company. Level III data validations were performed in accordance with the EPA functional guidelines (EPA 2008, 2010) and criteria established in the Data Quality Objectives (Section 8.2) of the Phase 2 Work Plan. Four data validation reports (DVRs) were produced by LDC. Each memorandum was reviewed and approved by Anchor QEA's QA Manager and are included as Appendix F.

The data validation verified the analytical accuracy and precision of the chemical analyses performed during this sampling effort and no data were rejected. The data may have been qualified as estimated for a particular analysis based on method or technical criterion. Data qualified with a "J" indicates that the associated numerical value is the approximate concentration of the analyte. Data qualified with a "UJ" indicates the approximate reporting limit below which the analyte was not detected. Consequently, these data qualifications are not expected to alter the data quality objectives defined in the work plan.

Sample data collected and analyzed by Boeing for internal Boeing waste characterization and laboratory comparison purposes were not validated.

All soil data were determined to be useable as reported from the laboratory or as qualified in this Summary Report for the purposes of the Phase 2 Investigation objectives.

5 COST SUMMARY

This section summarized the costs incurred to implement the Modified AOC by Jorgensen Forge and Boeing in 2012. These costs include sub-consultant fees, soil and QA sample collection, split sample collection, sample analysis, analytical validation, investigation-derived waste disposal, and regular communications between Jorgensen Forge and Boeing.

- Approximate Jorgensen Forge-incurred Cost: \$150,000
- Approximate Boeing-incurred Cost: \$44,000
- EPA-incurred Costs: Not available at the time of this report

6 CONCLUSIONS

This section summarizes the conclusions of the Phase 2 Investigation relative to the objectives identified in the Phase 2 Work Plan and summarized in Section 1.

6.1 Objective 1: Lateral and Vertical Extents of PCBs Greater than 1 mg/kg

Objective 1 was achieved through the analysis of PCBs for all primary boring locations as well as select secondary boring samples. All primary boring locations except boring B-DGP1 resulted in at least one sample interval with a total PCB concentration of greater than 1 mg/kg.

All Phase 2 Investigation borings were advanced to the depths specified in the Phase 2 Work Plan. PCBs were vertically bounded in depth (i.e., no concentration greater than 1 mg/kg was found in the deepest analytical interval) with the exception of JF-DGP3. At JF-DGP3, the total PCB result was greater than 1 mg/kg in the deepest "native" soil analytical interval (i.e., 7 feet into the native interval). However, all directly adjacent Phase 2 borings were vertically bounded indicating the vertical extent of PCBs greater than 1mg/kg in this area is limited.

6.2 Objective 2: Additional Chemical Analyses to Support Removal Action Evaluations

Objective 2 was achieved through the analysis of a suite of chemical parameters in addition to PCBs at several boring locations. As discussed in Section 2.4, primary boring locations JF-DGP2 and JF-DGP5 were pre-selected for metals, VOC, and SVOC analysis based on proximity to T2B4 (i.e., this location had highest observed total PCB concentrations at 274 mg/kg from 18 to 20 feet bgs identified during the Phase 1 Investigation). These results, in addition to the data collected to satisfy Objective 1 and Objective 2, provide sufficient data to support waste management/disposal suitability, worker safety, and sediment protectiveness evaluations during design and implementation of any required removal action. These considerations will be refined and incorporated into the removal action, as necessary.

6.3 Objective 3: Correlation of Debris Fill and Chemical Concentrations

Objective 3 was adequately achieved by comparing the chemical data collected in the Phase 2 Investigation to those samples with debris fill material discussed in Section 2.4. Four boring depth intervals with debris fill were submitted for PCB laboratory analysis and PCBs were detected at a wide concentration range from 219 mg/kg to 2.49 mg/kg. However, concentrations of PCBs were detected at a similar range in debris-free granular fill material as well as in the underlying native soil. In short, there does not appear to be a correlation between debris fill and elevated PCB concentrations.

Any correlation between debris fill and metals is less evident primarily due to the limited number of samples analyzed for metals. The two field identified debris fill intervals from JF-DGP2 and JF-DGP4 were also submitted for metals analysis as described in Section 2.2. The arsenic concentrations at location JF-DGP2 and the cadmium and lead concentrations at JF-DGP4 exceeded the preliminary screening level. While the both samples resulted in elevated metals concentrations, the individual elevated metals species in the two samples were inconsistent (i.e., elevated arsenic in one sample versus elevated cadmium and lead in the other). This inconsistency, coupled with the very limited metals sample size, does not allow for adequate comparison between metals concentrations in debris fill versus debris-free fill materials.

In conclusion, elevated PCBs concentrations were identified in debris fill, debris-free granular fill and native materials. Elevated metals concentrations were identified in debris fill, however, data are insufficient to draw a similar conclusion regarding metals in the surrounding material. Accordingly, debris fill is not a definitive indicator of an original source of PCBs and is indeterminate regarding metals within the Outfall Site. Contamination associated with the Pipes is sufficiently bounded to support remedy planning.

7 REFERENCES

- Farallon and Anchor QEA (Farallon Consulting, L.L.C. and Anchor QEA, LLC), 2012. *Phase 2 Geoprobe Soil Investigation Work Plan, Jorgensen Forge. Jorgensen Forge Outfall Site*. Prepared for the Jorgensen Forge Corporation and The Boeing Company. February 2012.
- Floyd|Snider, 2010. *Jorgensen Forge Outfall Site Source Control Action 15-inch and 24-inch Pipes Cleanout Work Plan*. Prepared for The Boeing Company. December 2010.
- Floyd|Snider, 2011. *Source Control Action Completion Report*. Prepared for The Boeing Company and Jorgensen Forge Corporation. May 27, 2011.
- Floyd|Snider, 2012. *Draft Final 2-66 Area Focused Soil and Groundwater Investigation Report*. Prepared for The Boeing Company. April 16, 2012.
- EPA (U.S. Environmental Protection Agency), 2008. *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. USEPA 540-R-08-01. June 2008.
- EPA, 2010. *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Methods Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. USEPA 540-R-10-011. January 2010.

TARGET SHEET: Electronic Media

Document ID: DVD ATTACHED TO 1475196

Site File:

Folder:

This media was not imaged due to the original being:

☐ CD

☒ DVD

☐ USB Drive

☐ Hard Drive

☐ Floppy Disk

☐ VHS Tape*

☐ Cassette*

☐

Documents on this media are available under the following document IDs:

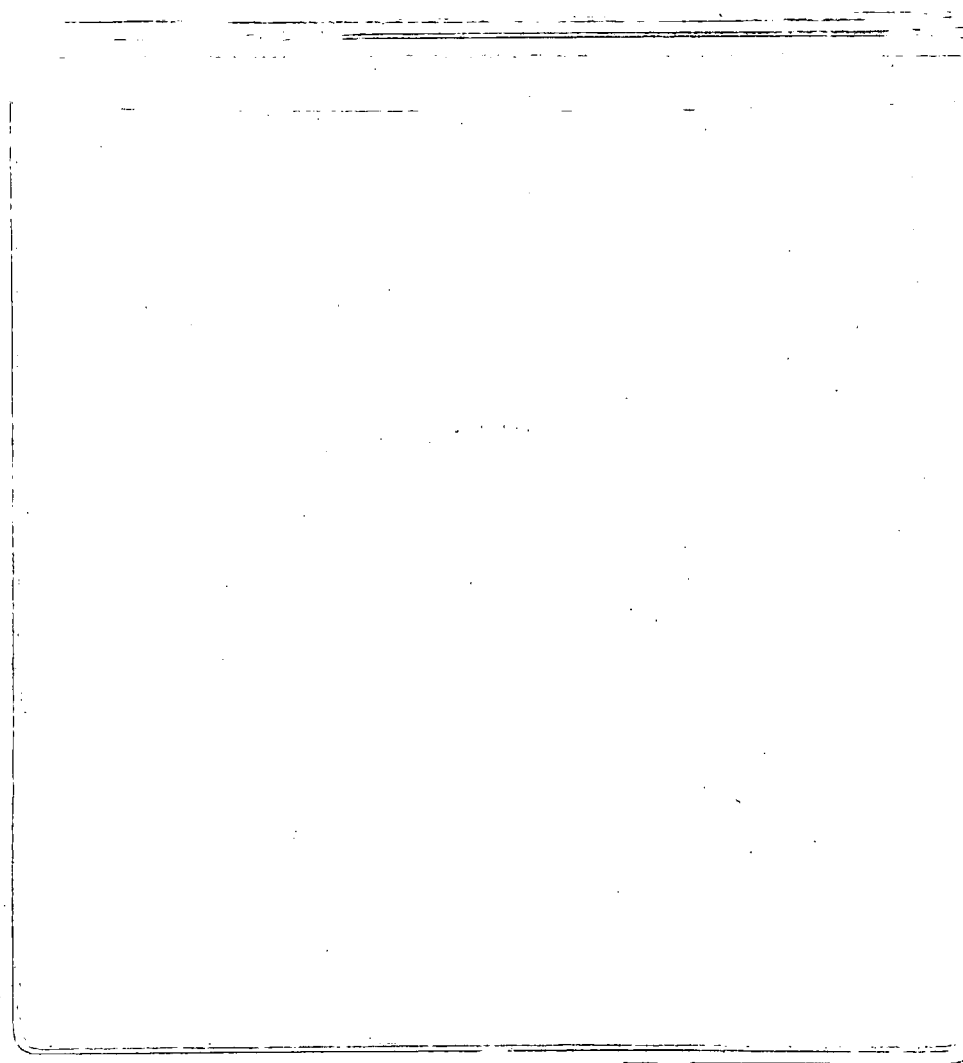
TABLES AND APPENDICES. PHASE 2 GEOPROBE INVESTIGATION
SUMMARY REPORT. JORGENSEN FORGE OUTFALL SITE. AUGUST 8,
2012.

*Please contact the Superfund Records Center to access this information.



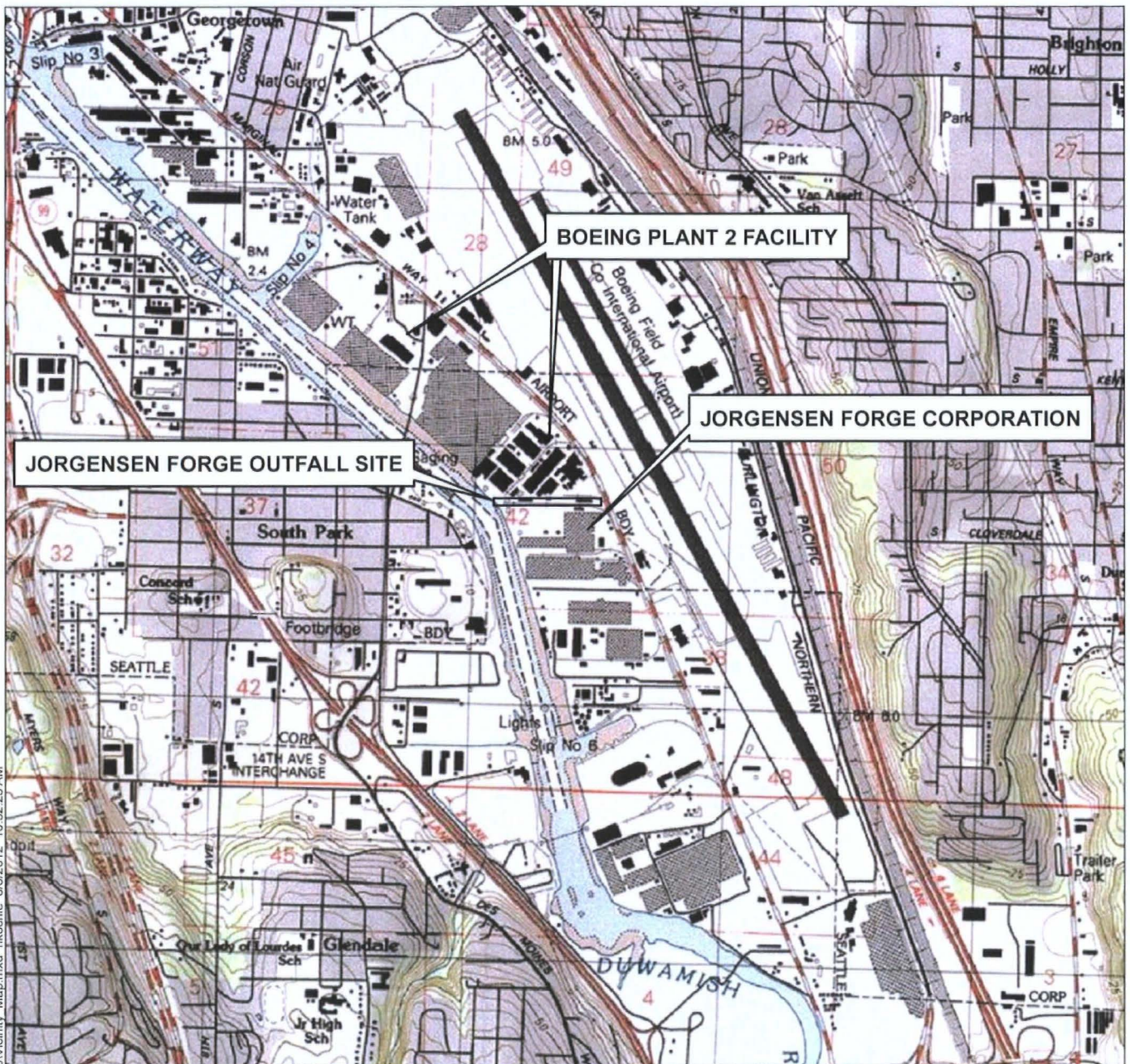
Region 10
1200 Sixth Ave.
Seattle, WA 98101

TABLES (ON DVD)



FIGURES

Q:\Jobs\010128-01_Jorgensen_Duwamish\Maps\2012_05\Vicinity_Map.mxd nkoehie 8/6/2012 10:32:23 AM

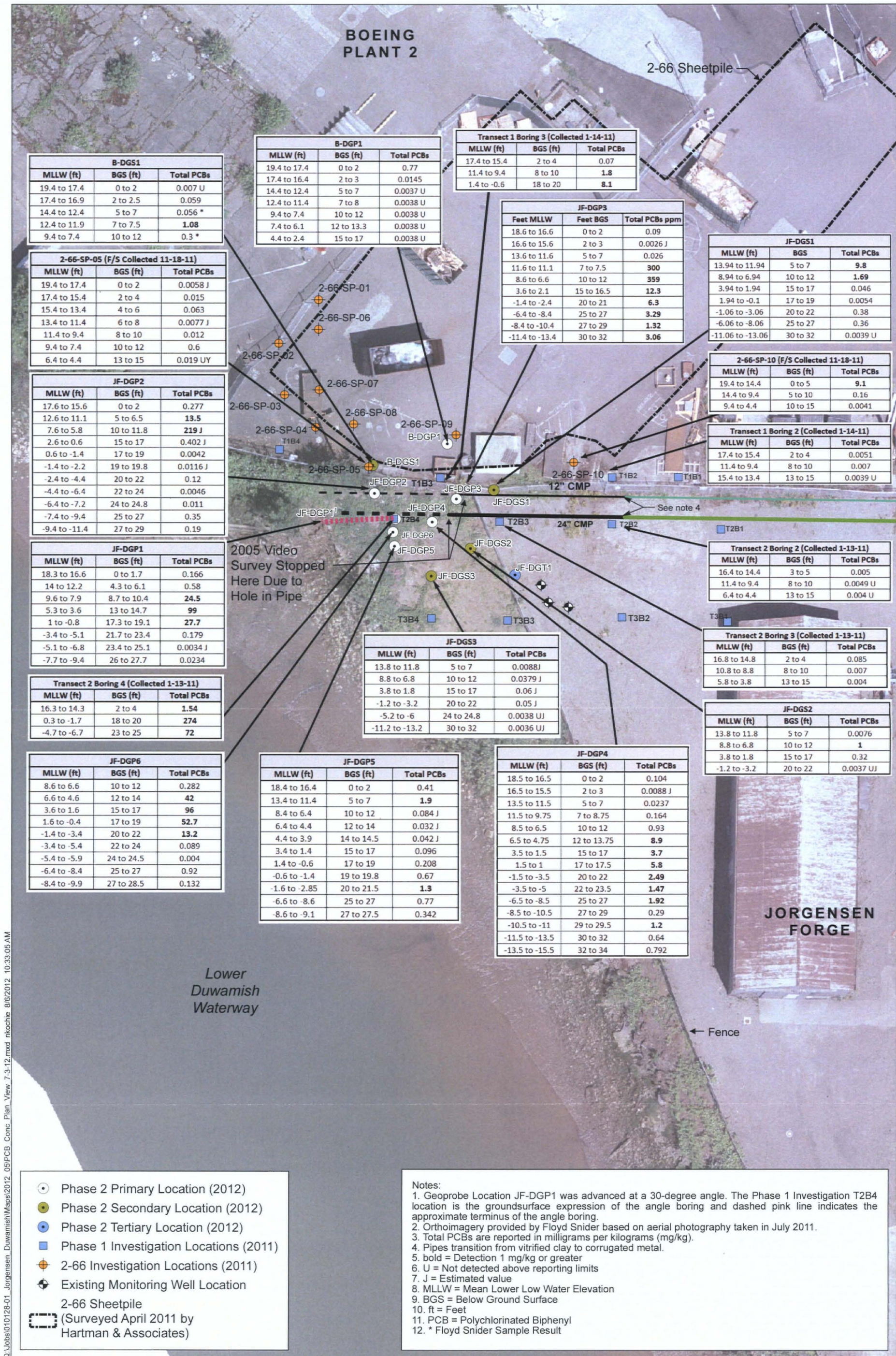


SOURCE: Base map prepared from USGS 7.5 minute quadrangle map of Seattle South, WA, dated 1983

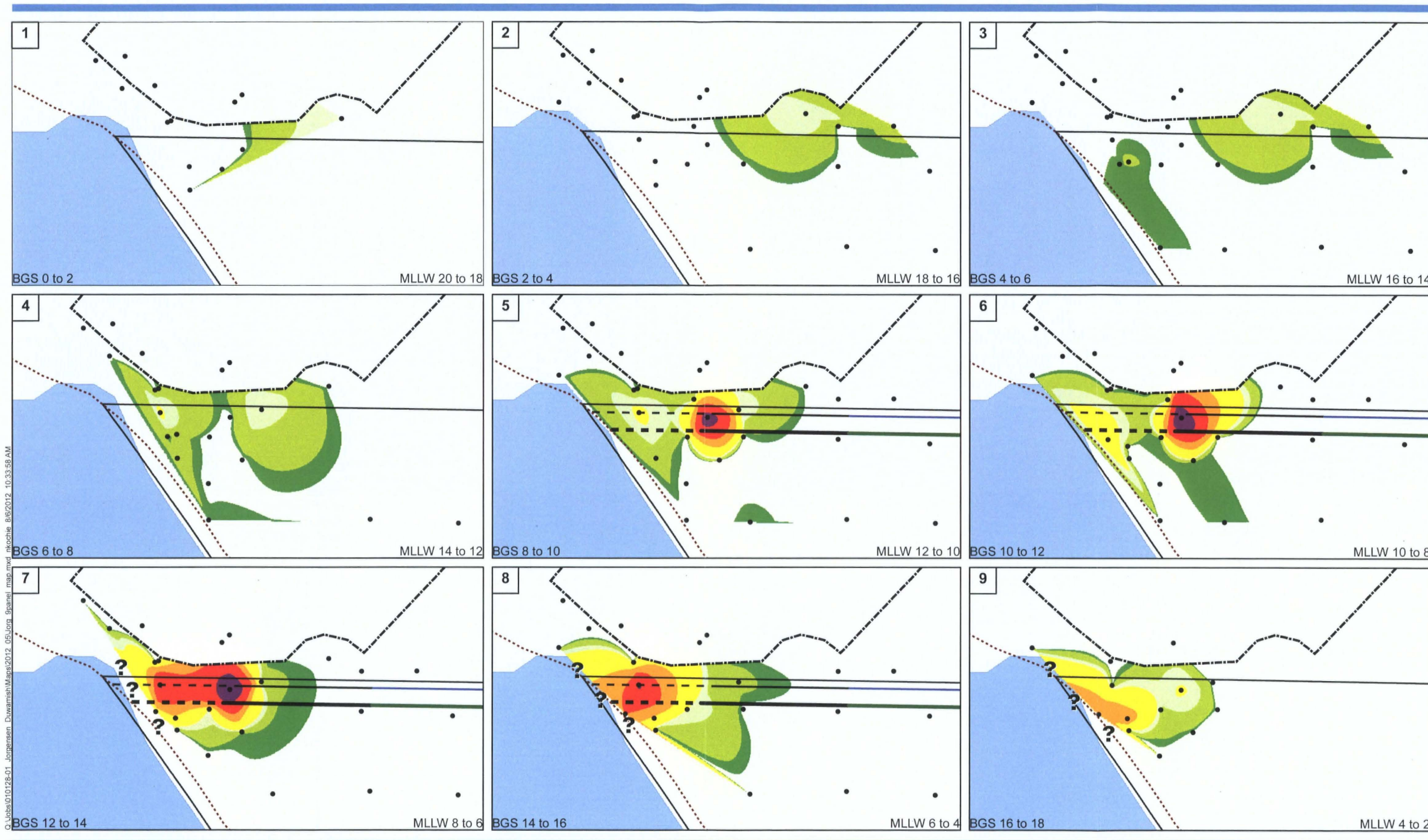
NOTE: As described in the Administrative Order on Consent, the Property Line Outfall Site is a 24-inch outfall and an adjacent Boeing 12-inch outfall trending along the northern boundary of the Jorgensen Forge facility.

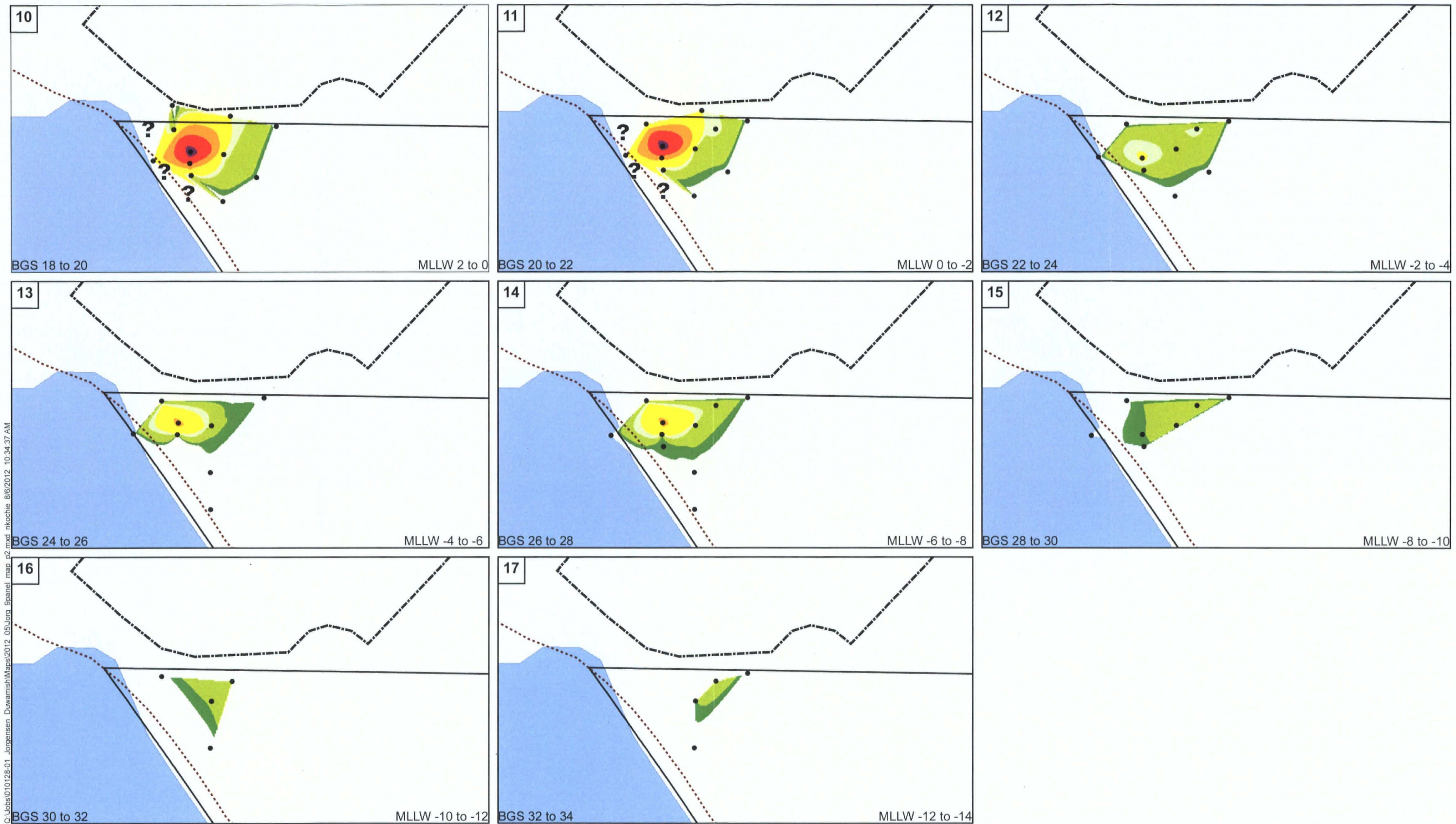


Feet
0 1,000 2,000



Q:\Jobs\010128-01_Jorgensen_Duwamish\Maps\2012_05\PCB_Conc_Plan_View_7-3-12.mxd nkoehie 8/6/2012 10:33:05 AM





APPENDIX A
PHOTOGRAPHS (ON DVD)

APPENDIX B
BORING LOGS

Log of Boring: B-DGP1

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/27/12 1300
Date/Time Completed: 3/27/12 1500
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push

Sampler Type: 5' Macrocore
Drive Hammer (lbs.): Auto
Depth of Water ATD (ft bgs): 11
Total Boring Depth (ft bgs): 25
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-0.5' bgs: Asphalt and gravel.	SW-SM		60	NA	6.4	B-DGP1-SO-00-02	x	Bentonite Seal
		0.5-1.8' bgs: Well-graded SAND with silt and gravel, fine to medium sand, fine gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	GM				1.5	B-DGP1-SO-02-03	x	
		1.8-1.9' bgs: Silty GRAVEL, coarse, gray, moist, no odor, blue crystals.	SW-SM							
5		1.9-3' bgs: Well-graded SAND with silt, fine to medium, brown, moist, no odor. (Silt is undifferentiated from clay).	SM		60		2.8	B-DGP1-SO-05-07	x	
		5-8' bgs: Silty SAND fining to sandy SILT, fine sand, orange to brown, moist, no odor, inorganic, low plasticity.					2.2	B-DGP1-SO-07-08.0	x	
10		10-11' bgs: Sandy SILT, fine to medium sand, gray, moist, no odor, coarsening downward.	ML		60		5.3	B-DGP1-SO-10-12	x	
		11-13.3' bgs: Silty SAND, fine to medium sand, brown, wet, no odor, coarsening downward.	SM				5.2	B-DGP1-SO-12-13.33	x	
15		15-19.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor. Soil below 15' bgs was field-identified as consistent with "Native soils" identified in Boeing Phase 1 investigation.	SW-SM		100		1.5	B-DGP1-SO-15-17	x	
							1.4	B-DGP1-SO-17-19	x	
20		20-24.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM		100		1.1			
25										

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 1275810.257
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 195820.7614

Log of Boring: B-DGS1

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/27/12 1130

Date/Time Completed: 3/27/12 1400

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 11.5

Total Boring Depth (ft bgs): 30

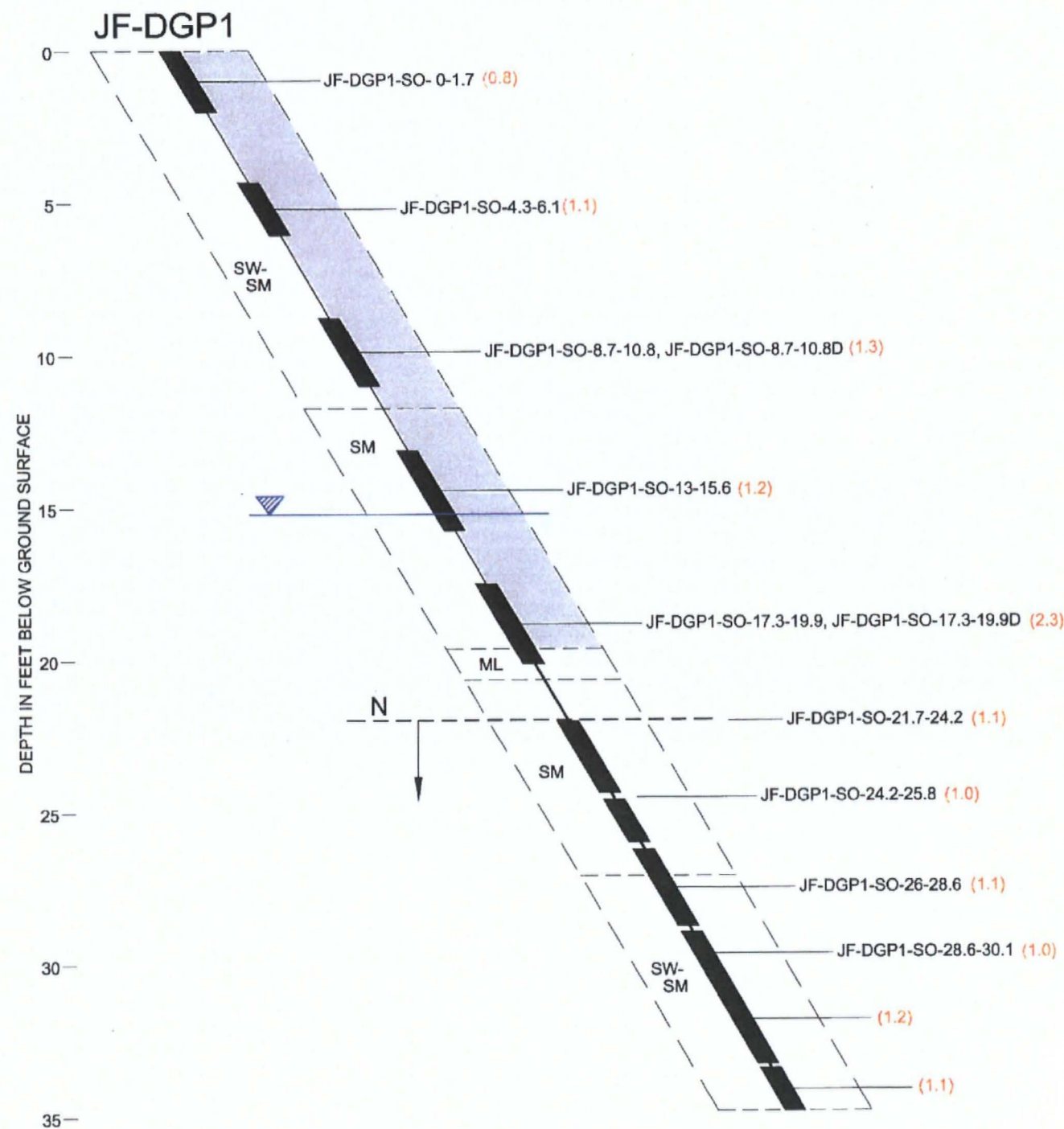
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-0.3' bgs: Asphalt and gravel.	SW		50	NA	0.8	B-DGS1-SO-00-02 (archived)		
		0.3-2.5' bgs: Well-graded SAND with gravel, fine to coarse sand and gravel, brown, moist, no odor.	SW				0.6	B-DGS1-SO-02-02.5 (archived)		
5		5-6.6' bgs: Well-graded SAND with gravel, fine to coarse sand and gravel, brown, moist, no odor.	SW		50		0.4	B-DGS1-SO-05-07 (archived)		
		6.6-7.5' bgs: Silty SAND with gravel, fine to coarse sand, mostly coarse gravel, black, moist, no odor, fine black substance*, no sheen.	SM				1.0	B-DGS1-SO-07-07.5 (archived)		
10		10-10.6' bgs: Well-graded SAND with gravel, fine to coarse sand and gravel, brown, moist, no odor, could be slough.	SW		40		1.2	B-DGS1-SO-10-12 (archived)		
		10.6-12' bgs: Heterogenous mix of silty SAND with gravel, fine to coarse sand, mostly coarse gravel, brown and orange, moist to wet at 11.5' bgs, no odor, fine orange substance* at 11' bgs, no sheen.	SM							
15		15-19.5' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor. Soil below 15' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SW-SM		90		1.2	B-DGS1-SO-15-17 (archived)		
							1.5	B-DGS1-SO-17-19 (archived)		
20		20-24.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM		100					
25		24.8-25' bgs: Wood, organic-like odor.	PT		100		1.1			
		25-29.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor, wood fragments.	SW-SM							
30										

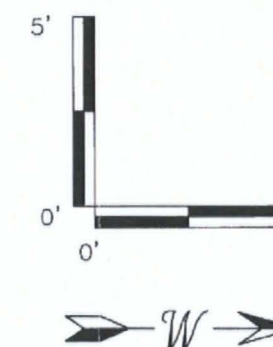
* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 1275789.373
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 195814.6761



LEGEND	
BORING ADVANCED AT ANGLE 30° FROM VERTICAL BORING TOTAL LENGTH OF 40' = VERTICAL DEPTH OF 35' BGS	
	INDICATES ODORS, SHEEN, STAINING AND/OR FINE BLACK SUBSTANCE
	DEPTH TO GROUNDWATER AT TIME OF DRILLING
	SOIL SAMPLE LOCATION AND IDENTIFICATION
	VOLATILE ORGANIC VAPOR MEASUREMENT USING PHOTOIONIZATION DETECTOR
	LITHOLOGIC CONTACT
	INTERFACE TO NATIVE-TYPE SOIL, AS FIELD IDENTIFIED
SM	SILTY SAND AND SILTY SAND WITH GRAVEL
ML	SANDY SILT
SW/SM	WELL-GRADED SAND WITH SILT



LOG OF BORING JF DGP1

JORGENSEN FORGE
PHASE 2 SOIL INVESTIGATION
SEATTLE, WASHINGTON

FARALLON PN: 394-001

Drawn By: DEW Checked By: JP Date: 5/17/12 Disk Reference: 394001

Log of Angled Boring: JF-DGP1

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/29/12 1400
Date/Time Completed: 3/29/12 1600
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push
Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto
Depth of Water (ft): 12-15' bgs
Vertical Boring Depth (ft bgs): 34.5
Inclined Boring Depth (ft): 40

Vertical Depth (feet bgs)	Inclined Depth	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppmv)	Sample ID	Sample Analyzed	Boring/Well Construction Details
------------------------------	----------------	-----------------	------------------------	------	--------------	------------	-------------------	------------	-----------	-----------------	--

0	0		0-2' (lineal): Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown to black, moist, no odor, fine black substance*. (Silt is undifferentiated from clay).	SW-SM		40	NA	0.8	JF-DGP1-0-1.7	x	Bentonite Seal
5			5-7' (lineal): Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown to black, moist, no odor, fine black substance*.	SW-SM		40		1.1	JF-DGP1-SO-4.3-6.1	x	
10			10-12.5' (lineal): Well-graded SAND with silt and gravel, fine to coarse sand and gravel, reddish brown to black, moist, no odor, wood, fine black substance*. (Silt is undifferentiated from clay).	SW-SM		50		1.3	JF-DGP1-SO-8.7-10.8, JF-DGP1-SO-8.7-10.8D	x x	
15			15-18' (lineal): Silty SAND with gravel, fine to coarse sand and gravel, orange to black, wet, no odor, light sheen, fine black substance*.	SM		60		1.2	JF-DGP1-SO-13-15.6	x	
20			20-22.3' (lineal): Silty SAND with gravel, fine to coarse sand and gravel, orange to black, wet, odor, sheen, wood, fine black substance*.	SM		70		2.3	JF-DGP1-SO-17.3-19.9, JF-DGP1-SO-17.3-19.9D	x x	
25			22.3-23.5' (lineal): Sandy SILT, fine sand, gray to black, wet, no odor, wood.	ML							
30			25-29.8' (lineal): Silty SAND, fine, gray, wet, no odor, coarsening downward. Soil below 25' (lineal) was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		96		1.1	JF-DGP1-SO-21.7-24.2	x	
35			30-31' (lineal): Silty SAND, fine to medium sand, gray, wet, no odor.	SM				1.0	JF-DGP1-SO-24.2-25.8	x	
40			31-34.8' (lineal): Well-graded SAND with silt, fine to medium, dark gray, wet, no odor, some thin silty layers.	SW-SM		96		1.1	JF-DGP1-SO-26-28.6	x	
			35-39.8' (lineal): Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM				1.0	JF-DGP1-SO-28.6-30.1 (archived)		

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type:	NA	Filter Pack:	NA	Ground Surface Elevation (ft msl):	NA
Casing Diameter (in):	NA	Surface Seal:	Concrete	Top of Casing Elevation (ft msl):	NA
Screen Slot Size (in):	NA	Annular Seal:	NA	Surveyed Location:	X: 1275795.286
Screened Interval (ft bgs):	NA	Boring Abandonment:	Bentonite		Y: 195799.4743



Log of Boring: JF-DGP2

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/29/12 0830

Date/Time Completed: 3/29/12 1030

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 6

Total Boring Depth (ft bgs): 40

Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-2' bgs: Well-graded SAND with silt and gravel, fine to medium sand, fine to coarse gravel, brown to black, moist, no odor, fine black substance*.	SW-SM		41	NA	0.6	JF-DGP2-SO-00-02, JF-DGP2-SO-02	X	Bentonite Seal
5		5-6' bgs: Well-graded SAND with silt and gravel, fine to medium sand, fine to coarse gravel, brown to black, moist, no odor, fine black substance*.	SW-SM		30		0.3	JF-DGP2-SO-05-06.5	x	
			ML					JF-DGP2-SO-00-10	x	
10		6-6.5' bgs: Sandy SILT with gravel, fine to coarse sand and gravel, orange to brown, wet, no odor.	ML		35		0.7	JF-DGP2-SO-10-11.8	x	
								JF-DGP2-SO-10-20	x	
15		10-11.8' bgs: Sandy SILT with gravel, fine to coarse sand and gravel, orange to brown, wet, no odor, glass, low plasticity, inorganic.	ML		97		0.5	JF-DGP2-SO-15-17, JF-DGP2-SO-16	X	
			SP-SM				0.4	JF-DGP2-SO-17-19	x	
20		15-19.8' bgs: Sandy SILT transitioning to poorly graded SAND with silt, fine sand, gray, wet, no odor, silt clasts. Soil below 18' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SP-SM		97		0.4	JF-DGP2-SO-19-19.8	x	
			SW-SM				0.3	JF-DGP2-SO-20-22	x	
25		20-24.8' bgs: Poorly graded SAND with silt grades to well-graded SAND with silt, fine to medium, gray, wet, no odor, wood.	SW-SM					JF-DGP2-SO-20-30	x	
								JF-DGP2-SO-22-24	x	
30		25-26' bgs: Well-graded SAND with silt, fine to medium, gray, wet, no odor.	SW-SM		97		0.5	JF-DGP2-SO-24-24.8	x	
			SP-SM				0.9	JF-DGP2-SO-25-27, JF-DGP2-SO-26	X	
35		26-27' bgs: Poorly graded SAND with silt, fine, gray, wet, no odor, wood at 26.5' bgs.	SW-SM		25		0.7	JF-DGP2-SO-27-29	x	
			GP					JF-DGP2-SO-29-29.8	x	
40		27-29.8' bgs: Well-graded SAND with silt, fine to medium, gray, wet, no odor.	SW-SM					JF-DGP2-SO-30-31.5	x	
		30-31' bgs: Well-graded SAND with silt, fine to medium, gray, wet, no odor.	SW-SM		100					
		31-31.5' bgs: Poorly graded GRAVEL, coarse gravel, trace fine to medium sand, gray, wet, no odor.								
		35-38.8' bgs: Well-graded SAND with silt, fine to medium, gray, wet, no odor.								

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA

Casing Diameter (inches): NA

Screen Slot Size (inches): NA

Screened Interval (ft bgs): NA

Filter Pack: NA

Surface Seal: Concrete

Annular Seal: NA

Boring Abandonment: Bentonite

Ground Surface Elevation (ft): NA

Top of Casing Elevation (ft): NA

Surveyed Location: X: 1275789.877

Y: 195806.697

Log of Boring: JF-DGP3

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/28/12 1245
Date/Time Completed: 3/28/12 1400
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push

Sampler Type: 5' Macrocore
Drive Hammer (lbs.): Auto
Depth of Water ATD (ft bgs): 10.5
Total Boring Depth (ft bgs): 35
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-3' bgs: Well-graded SAND with silt and gravel, fine to medium sand, fine to coarse gravel, black and gray, moist, no odor, fine black substance*. (Silt is undifferentiated from clay).	SW-SM		60	NA	1.0	JF-DGP3-SO-00-02	x	Bentonite Seal
							1.3	JF-DGP3-SO-02-03	x	
5		5-6' bgs: Well-graded SAND with gravel, fine to medium sand, fine to coarse gravel, black and gray, moist, no odor, yellow specks, fine black substance*.	SW		50		1.9	JF-DGP3-SO-05-07	x	
			SW-SM				3.4	JF-DGP3-SO-07-07.5	x	
10		6-7.5' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown with black to red area past 7' bgs, moist, no odor.	SM		40		1.1	JF-DGP3-SO-10-12	x	
		10-12' bgs: Silty SAND with gravel, fine to medium sand, fine to coarse gravel, orange, wet, no odor.								
15		15-16.5' bgs: Silty SAND with gravel, fine to medium sand, fine and some coarse gravel, gray, wet, faint odor, sheen. (Silt is undifferentiated from clay).	SM		25		18.6	JF-DGP3-SO-15-16.5, JF-DGP3-SO-15	x x	
20		20-21' bgs: Well-graded SAND with gravel, fine to coarse sand, fine gravel, gray, wet, no odor, light sheen, glass, fine black substance*.	SW		20			JF-DGP3-SO-20-21	x	
25		25-29' bgs: Silty SAND, fine, gray, wet, no odor, light sheen, trace fine to coarse gravel at 27.5' bgs, wood. Soil below 25' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		80		5.2	JF-DGP3-SO-25-27	x	
								JF-DGP3-SO-27-29, JF-DGP3-SO-27-29D	x x	
30		30-34.8' bgs: Well-graded SAND with silt, fine sand, dark gray, moist to wet, no odor, no sheen.	SW-SM		100		5.6	JF-DGP3-SO-30-32	x	
35							2.3			

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 1275812.864
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 195805.095



Log of Boring: JF-DGP4

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/28/12 1400

Date/Time Completed: 3/29/12 1200

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 12

Total Boring Depth (ft bgs): 35

Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-3' bgs: Well-graded SAND with gravel, fine to coarse sand and gravel, brown to black, moist, no odor.	SW		60	NA	0.5	JF-DGP4-SO-00-02	x	Bentonite Seal
							0.5	JF-DGP4-SO-02-03	x	
5		5-8' bgs: Well-graded SAND with gravel, fine to coarse sand and gravel, brown to black, moist, no odor, yellow flecks.	SW		70		0.9	JF-DGP4-SO-05-07	x	
							1.1	JF-DGP4-SO-07-08.75	x	
								JF-DGP4-SO-08-8.8	x	
10		10-11' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown to black, moist, no odor, fine black substance*.	SW-SM		70		1.1	JF-DGP4-SO-10-12	x	
			SM				1.3	JF-DGP4-SO-12-13.75	x	
15		11-13.8' bgs: Silty SAND with gravel, fine to medium sand, fine gravel, black to orange, wet, no odor, wood.	GW-GM		50		3.4	JF-DGP4-SO-15-17	x	
							14.9	JF-DGP4-SO-17-17.5	x	
								JF-DGP4-SO-17	x	
20		15-17.8' bgs: Well-graded GRAVEL with silt and sand, fine to coarse sand and gravel, orange to black, wet, odor and sheen increasing with depth, wood, fine black substance*.	SW-SM		70		23.8	JF-DGP4-SO-20-22	x	
								JF-DGP4-SO-21	x	
25		20-21.5' bgs: Well-graded SAND with silt and gravel, fine to coarse sand, mostly fine gravel, dark gray, wet, no odor, glass, sheen, fine black substance*.	OL				5.9	JF-DGP4-SO-22-23.5	x	
							28.1	JF-DGP4-SO-25-27	x	
								JF-DGP4-SO-25-27D	x	
							10.7	JF-DGP4-SO-26	x	
								JF-DGP4-SO-27-29	x	
30		25-28' bgs: Sandy SILT, fine sand, black, wet, odor, sheen, wood fragments, low plasticity, coarsening downward, fine black substance*.	SM		95			JF-DGP4-SO-29-29.5	x	
							17.1	JF-DGP4-SO-30-32	x	
								JF-DGP4-SO-31	x	
35		28-29.8' bgs: Silty SAND, fine to medium sand, gray, wet, no odor, no sheen, coarsening downward. Soil below 28' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		95		34.1	JF-DGP4-SO-32-34	x	
								JF-DGP4-SO-33	x	
			SW-SM				2.7	JF-DGP4-SO-34-35 (archived)	x	
40		30-31' bgs: Silty SAND, fine to medium sand, gray to brown, wet, faint odor, no sheen.								
		31-34.8' bgs: Well-graded SAND with silt, fine to coarse sand, dark gray, wet, no odor, no sheen. (Lithology from 34-34.8' bgs was obtained from an adjacent boring on 3/30/12).								

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA

Casing Diameter (inches): NA

Screen Slot Size (inches): NA

Screened Interval (ft bgs): NA

Filter Pack: NA

Surface Seal: Concrete

Annular Seal: NA

Boring Abandonment: Bentonite

Ground Surface Elevation (ft): NA

Top of Casing Elevation (ft): NA

Surveyed Location: X: 1275806.080

Y: 195798.570

Log of Boring: JF-DGP5

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/29/12 1015
Date/Time Completed: 3/29/12 1400
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push

Sampler Type: 5' Macrocore
Drive Hammer (lbs.): Auto
Depth of Water ATD (ft bgs): approx. 10
Total Boring Depth (ft bgs): 30
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-2' bgs: Well-graded SAND with gravel, fine to medium sand, fine to coarse gravel, brown, moist, no odor, rock fragments at 2' bgs.	SW		40	NA	0.6	JF-DGP5-SO-00-02, JF-DGP5-SO-02	X X	Bentonite Seal
5		5-7' bgs: Well-graded SAND with gravel, fine to medium sand, fine to coarse gravel, brown, moist, no odor.	SW		40		0.5	JF-DGP5-SO-05-07 JF-DGP5-SO-00-10	X X	
10		10-11' bgs: Silty GRAVEL with sand, mostly fine gravel, fine to coarse sand, black, wet, no odor.	GM		90		0.8	JF-DGP5-SO-10-12	X	
		11-14.5' bgs: Silty SAND with gravel, fine to medium sand, fine gravel, gray, wet, no odor.	SM				0.8	JF-DGP5-SO-12-14	X	
15		15-17' bgs: Silty GRAVEL with sand, mostly fine gravel, fine to coarse sand, black, wet, no odor, fine black substance*. (Silt is undifferentiated from clay).	GM		98		1.1	JF-DGP5-SO-15-17, JF-DGP5-SO-16	X X	
		17-19' bgs: Silty SAND with gravel, fine to medium sand, fine gravel, brown to black, wet, no odor, fine black substance*.	SM				0.9	JF-DGP5-SO-17-19	X	
20		19-19.8' bgs: Well-graded GRAVEL with silt and sand, fine to coarse gravel and sand, gray, wet, no odor, glass and wood.	GW		23		2.4	JF-DGP5-SO-19-19.8	X	
		20-21' bgs: Well-graded SAND with silt and gravel, fine to coarse sand, fine gravel, gray, wet, no odor, light sheen.	SW-SM					JF-DGP5-SO-20-21.25	X	
25		21-21.3' bgs: Silty GRAVEL with sand, coarse, black, wet, no odor, fine black substance*.	GM				2.5	JF-DGP5-SO-25-27, JF-DGP5-SO-26	X X	
		25-27.5' bgs: Well-graded SAND with silt, fine to medium sand, dark gray, wet, no odor, glass at 25.5' bgs. Soil below 26' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SW-SM		50		2.5	JF-DGP5-SO-27-27.5 JF-DGP5-SO-20-30	X X	
30										

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 1275795.502
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 195791.735



FARALLON
consulting
975 5th Avenue Northwest
Issaquah, Washington 98027

Log of Boring: JF-DGP6

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/30/12 1000

Date/Time Completed: 3/30/12 1200

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 7

Total Boring Depth (ft bgs): 35

Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-2.2' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown to black, moist, no odor. (Silt is undifferentiated from clay).	SW-SM		40	NA	0.9	JF-DGP6-SO-00-02 (archived)		
5		5-7.5' bgs: Silty SAND with gravel, heterogenously mixed fine to coarse sand and gravel, brown to black, moist to wet at 7' bgs, no odor, fine black substance*.	SM		50		1.1	JF-DGP6-SO-05-07 (archived)		
							0.8	JF-DGP6-SO-07-07.5 (archived)		
10		10-11' bgs: Silty GRAVEL with sand, mostly fine gravel, fine to coarse sand, brown, wet, no odor.	GM		80		1.2	JF-DGP6-SO-10-12	x	
		11-14' bgs: Silty GRAVEL with sand, fine to coarse gravel and sand, black and orange, wet, no odor, fine black substance*.	GM				1.0	JF-DGP6-SO-12-14	x	
15		15-16.5' bgs: Silty GRAVEL with sand, fine to coarse gravel and sand, black and orange, wet, no odor, fine black substance*, no sheen.	GM		80		1.0	JF-DGP6-SO-15-17	x	
			SM				18.7	JF-DGP6-SO-17-19, JF-DGP6-SO-18.5	x x	
20		16.5-19' and 20-22' bgs: Silty SAND with gravel, heterogenously mixed fine sand and fine to coarse gravel, orange to black, wet, odor, sheen, much wood and glass.	SM		100		14.2	JF-DGP6-SO-20-22, JF-DGP6-SO-21	x x	
			SM/ML				3.4	JF-DGP6-SO-22-24	x	
25		22-24.5' bgs: Silty SAND grading to SILT, fine sand, brown, wet to moist, no odor, no sheen, inorganic with low plasticity.	ML		75		1.0	JF-DGP6-SO-24-24.5	x	
		24.5-24.8' bgs: SILT, trace fine sand, gray, moist, no odor, inorganic, moderate plasticity.	SW-SM				10.3	JF-DGP6-SO-25-27, JF-DGP6-SO-26	x x	
30		25-29.8' bgs: Well-graded SAND with silt, fine to medium sand, dark gray, moist, no odor, clay clasts. Soil below 25' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SW-SM		100		1.3	JF-DGP6-SO-27-28.5 (archived)		
			SW-SM				1.1	JF-DGP6-SO-30-32 (archived)		
35		30-34.8' bgs: Well-graded SAND with silt, fine to medium sand, dark gray, moist, no odor, clay clasts.					1.4	JF-DGP6-SO-32-34 (archived)		
								JF-DGP6-SO-34-35 (archived)		

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 195795.6768
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 1275795.03

Log of Boring: JF-DGS1

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/27/12 1430
Date/Time Completed: 3/27/12 1600
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push

Sampler Type: 5' Macrocore
Drive Hammer (lbs.): Auto
Depth of Water ATD (ft bgs): 12
Total Boring Depth (ft bgs): 35
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0	0-0.3' bgs:	Asphalt and gravel.	SW-SM		60	NA	0.6	JF-DGS1-SO-00-02 (archived)		
	0.3-3' bgs:	Well-graded SAND with silt, fine to medium sand, mostly fine gravel, brown, moist, no odor, wood.	SW-SM				0.8	JF-DGS1-SO-02-03 (archived)		Bentonite Seal
5	5-6' bgs:	Well-graded SAND with silt, fine to medium sand, mostly fine gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	SW-SM		40		1.1	JF-DGS1-SO-05-07 (archived)		
	6-7' bgs:	Silty SAND with gravel, fine sand, fine to coarse gravel, brown, moist, no odor, wood.	SM							
10	10-12' bgs:	Silty SAND with gravel, fine to med sand, fine to coarse gravel, brown to orange, moist, no odor.	SM		40		1.1	JF-DGS1-SO-10-12 (archived)		
15	15-19.8' bgs:	Well-graded SAND with silt, fine to coarse but fining downwards, dark brown to gray, wet, no odor.	SW-SM		100		1.2	JF-DGS1-SO-15-17 (archived)		
							0.9	JF-DGS1-SO-17-19 (archived)		
20	20-22.5' bgs:	Silty SAND heterogenously mixed, fine to medium sand, dark gray to brown, wet, no odor, organics from 20-21' bgs.	SM		60		1.0	JF-DGS1-SO-19-19.75 (archived)		
							0.8	JF-DGS1-SO-20-22 (archived)		
25	25-27.8' bgs:	Silty SAND heterogenously mixed, fine to medium sand, trace fine gravel, dark gray to brown, wet, no odor. Soil below approximately 25' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		60		1.1	JF-DGS1-SO-25-27 (archived)		
30	30-34.8' bgs:	Well-graded SAND, fine to medium, dark gray, wet, no odor.	SW		100		1.2	JF-DGS1-SO-30-32 (archived)		
35										

Monument Type: NA
Casing Diameter (inches): NA
Screen Slot Size (inches): NA
Screened Interval (ft bgs): NA

Well Construction Information
Filter Pack: NA
Surface Seal: Concrete
Annular Seal: NA
Boring Abandonment: Bentonite

Ground Surface Elevation (ft): NA
Top of Casing Elevation (ft): NA
Surveyed Location: X: 1275823.287
Y: 195807.707



Log of Boring: JF-DGS2

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/28/12 0940

Date/Time Completed: 3/28/12 1100

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 10

Total Boring Depth (ft bgs): 25

Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-0.2' bgs: Gravel and asphalt debris.	SW-SM		55	NA	1.0	JF-DGS2-SO-00-02 (archived)		
		0.2-2.8' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown and black, moist, no odor, fine black substance*. (Silt is undifferentiated from clay).	SW-SM					JF-DGS2-SO-02-02.8 (archived)		
5		5-5.5' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown and black, moist, no odor, fine black substance*.	SW-SM		55		1.0	JF-DGS2-SO-05-07 (archived)		
		5.5-7.8' bgs: Well-graded SAND with silt and gravel, fine to medium sand fining with depth, mostly fine gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	SW-SM					JF-DGS2-SO-07-07.8 (archived)		
10		10-12' bgs: Silty SAND with gravel, fine to coarse sand and gravel, orange with black and brown, wet, no odor, fine black substance*.	SM		40		1.3	JF-DGS2-SO-10-12 (archived)		
15		15-19.8' bgs: Silty SAND with gravel, fine to medium sand, coarse gravel, brown, wet, no odor, clay clasts. Soil below approximately 17' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		100		0.8	JF-DGS2-SO-15-17 (archived)		
							0.9	JF-DGS2-SO-17-19 (archived)		
20		20-24' bgs: Silty SAND with gravel, fine to medium sand, coarse gravel, brown, wet, no odor.	SM		100		0.8	JF-DGS2-SO-19-19.8 (archived)		
							0.9	JF-DGS2-SO-20-22 (archived)		
25		24-24.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM							

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA

Casing Diameter (inches): NA

Screen Slot Size (inches): NA

Screened Interval (ft bgs): NA

Filter Pack: NA

Surface Seal: Concrete

Annular Seal: NA

Boring Abandonment: Bentonite

Ground Surface Elevation (ft): NA

Top of Casing Elevation (ft): NA

Surveyed Location: X: 1275816.832

Y: 195791.096

Log of Boring: JF-DGS3

Page 1 of 1

Client: Jorgensen Forge Corporation
Project: Jorgensen Forge
Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/28/12 1100
Date/Time Completed: 3/28/12 1240
Equipment: Geoprobe
Drilling Company: Cascade Drilling, LP
Drilling Foreman: Elijah Floyd
Drilling Method: Direct Push

Sampler Type: 5' Macrocore
Drive Hammer (lbs.): Auto
Depth of Water ATD (ft bgs): 15
Total Boring Depth (ft bgs): 35
Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-2.5' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	SW-SM		50	NA	0.8	JF-DGS3-SO-00-02 (archived)		
								JF-DGS3-SO-02-02.5 (archived)		
5		5-7.8' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown to black at 6' bgs, moist, no odor, fine black substance*.	SW-SM		55		0.9	JF-DGS3-SO-05-07 (archived)		
								JF-DGS3-SO-07-07.8 (archived)		
10		10-14.8' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown with black areas at 11.5 and 13' bgs, moist, no odor, fine black substance*.	SW-SM		100		1.1	JF-DGS3-SO-10-12 (archived)		
							1.1	JF-DGS3-SO-12-14 (archived)		
15		15-15.8' bgs: Poorly graded GRAVEL (1/2" minus), gray, wet, no odor.	GP		100		0.9	JF-DGS3-SO-14-14.8 (archived)		
		15.8-18.3' bgs: Well-graded SAND with silt and gravel, fine to coarse sand and gravel, brown and gray, wet, no odor.	SW-SM				0.9	JF-DGS3-SO-15-17 (archived)		
20		18.3-19.8' bgs: Well-graded SAND with silt, fine to medium sand, trace coarse gravel, black, wet, no odor, wood, sheen, fine black substance*.	SW-SM		100		1.0	JF-DGS3-SO-17-19, JF-DGS3-SO-18.3-19 (archived)		
		20-21.2' bgs: Silty SAND with gravel, fine to coarse sand and gravel, brown and gray, wet, no odor, wood fragments, light sheen.	SM				0.9	JF-DGS3-SO-19-19.8 (archived)		
25		21.2-24' bgs: Silty SAND with gravel, fine to medium sand, fine to coarse gravel, gray, moist, no odor, wood, no sheen.	SM				0.8	JF-DGS3-SO-20-22 (archived)		
		24-24.8' bgs: Well-graded SAND with silt, fine to medium sand, trace fine gravel, dark gray, wet, no odor. Soil below 24' bgs was field-identified as consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SW-SM		0			JF-DGS3-SO-22-24 (archived)		
30		30-32' bgs: Well-graded SAND with silt fining to silty SAND, fine sand, dark gray, wet, no odor.	SW-SM		50		0.7	JF-DGS3-SO-24-24.8 (archived)		
								JF-DGS3-SO-30-32 (archived)		

* Fine substance used to describe an observed material that was not able to be classified as to soil type or origin.

Well Construction Information

Monument Type: NA	Filter Pack: NA	Ground Surface Elevation (ft): NA
Casing Diameter (inches): NA	Surface Seal: Concrete	Top of Casing Elevation (ft): NA
Screen Slot Size (inches): NA	Annular Seal: NA	Surveyed Location: X: 1275805.772
Screened Interval (ft bgs): NA	Boring Abandonment: Bentonite	Y: 195783.301



FARALLON
consulting
975 5th Avenue Northwest
Issaquah, Washington 98027

Log of Boring: JF-DGT1

Page 1 of 1

Client: Jorgensen Forge Corporation

Project: Jorgensen Forge

Location: Seattle, WA

Farallon PN: 394-001

Logged By: Jon Peterson

Date/Time Started: 3/28/12 0830

Date/Time Completed: 3/28/12 0940

Equipment: Geoprobe

Drilling Company: Cascade Drilling, LP

Drilling Foreman: Elijah Floyd

Drilling Method: Direct Push

Sampler Type: 5' Macrocore

Drive Hammer (lbs.): Auto

Depth of Water ATD (ft bgs): 11

Total Boring Depth (ft bgs): 25

Total Well Depth (ft bgs): NA

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0-0.3' bgs: Gravel and asphalt debris.			55	NA	0.6	JF-DGT1-SO-00-02 (archived)		
		0.3-2.7' bgs: Silty SAND, fine to medium sand, trace fine gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	SM					JF-DGT1-SO-02-02.75 (archived)		
5		5-6.3' bgs: Silty SAND with gravel, fine to coarse sand and gravel, brown, moist, no odor. (Silt is undifferentiated from clay).	SM		25		0.8	JF-DGT1-SO-05-06.25 (archived)		
10		10-11' bgs: Silty SAND with gravel, fine to coarse gravel and sand fining downward, brown, moist, no odor. (Silt is undifferentiated from clay).	SM		58		0.8	JF-DGT1-SO-10-12 (archived)		
		11-13.8' bgs: Silty SAND, fine to medium sand, brown, moist to wet, gray, no odor, clay clast.	SM				0.7	JF-DGT1-SO-12-13.8 (archived)		
15		15-17.5' bgs: Silty SAND with gravel, fine to medium sand, coarse gravel, gray, wet, no odor. Soil below 15' bgs is consistent with "Native soils" identified in the Boeing Phase 1 investigation.	SM		100		0.6	JF-DGT1-SO-15-17 (archived)		
		17.5-19.8' bgs: Sandy SILT, fine to medium sand fining downwards, gray, wet to moist, no odor, inorganic, low plasticity.	ML				0.7	JF-DGT1-SO-17-19 (archived)		
20		20-21' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM		100		0.8			
		21-23' bgs: Sandy SILT, fine, gray, wet to moist, no odor, inorganic, low plasticity.	ML				0.8			
		23-24.8' bgs: Well-graded SAND with silt, fine to medium, dark gray, wet, no odor.	SW-SM							
25										

Monument Type: NA

Casing Diameter (inches): NA

Screen Slot Size (inches): NA

Screened Interval (ft bgs): NA

Well Construction Information

Filter Pack: NA

Surface Seal: Concrete

Annular Seal: NA

Boring Abandonment: Bentonite

Ground Surface Elevation (ft): NA

Top of Casing Elevation (ft): NA

Surveyed Location: X: 1275829.189

Y: 195783.598

APPENDIX C
ANALYTICAL REPORTS (ON DVD)

APPENDIX D
DATA VALIDATION REPORTS (ON DVD)

APPENDIX E
BOEING SPLIT DATA LAB REPORTS (ON
DVD)

APPENDIX F
SELECT TABLES FROM THE DRAFT FINAL
2-66 AREA FOCUSED SOIL AND
GROUNDWATER INVESTIGATION
REPORT (ON DVD)
